

**GEOLOGY DEPARTMENT  
AMERICAN UNIVERSITY OF BEIRUT**



Second Semester Final Examination

**INVERTEBRATE PALEONTOLOGY  
(G-215)**

This examination is made of **SIX PARTS**. Each part begins with certain relevant instructions to abide by. Be careful when you read and answer. Do not be hasty and remember that good students are sometimes the last to leave the examination room. Note that clear, concise, neat answers and supportive illustrations in addition to good handwriting will be eventually in your favour.

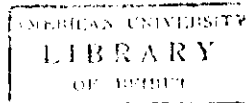
Do not forget to write your name on this page. It worths also checking the number of pages and parts of the examination in the booklet before and after answering the questions. The total number of pages, including this page is **SIX**. Remember that any lacking page or answer will be on your responsibility.

Date: June 25, 1998

Name: \_\_\_\_\_

Time: From 2:00 to 4:30 p.m.

Student No: \_\_\_\_\_



**PART I**  
**TRUE-FALSE**  
**(14 MARKS)**

It is required to mark the true statement with a clear **T** and the false statement with a clear **F**. Then correct the incorrect ones. A mark joining T and F like T is considered a wrong answer. A definition or an explanation instead of the required term is not a substitution and will not be counted.

1. The line that joins the adductor muscles of Bivalves is known by paleontologist as the elongated ligament.
2. Living Nautilus is confined to the East Pacific Province.
3. The central area of the Echinoid shell, on the aboral surface, which contains the anus, is called the apical disc.
4. The pleural area of the Trilobites is the segmented area.
5. The flattened area immediately under the beak of the Bivalves is called the hinge plate.
6. The Gastropoda siphon may be set in a slit band whose track is calcified and called vorex.
7. The septal neck of the Nautiloids is prochoanitic.
8. The tubercle of the interamb consists of a boss and a socket.
9. The skeleton of the Graptolites as a whole is named rhabdosome.
10. The Gastropoda holostomous aperture is equipped with a groove for the exhalent siphon.
11. The axis of growth of Belemites is centro-dorsal.
12. The zigzag lines between the ambis is referred to as the per-radial sutures.
13. The prosogyral Bivalves have the umbones anterior to the midline.
14. The lappets may develop on either side of the aperture of a compressed Ammonoid.

**PART II**  
**FILL IN BLANKS**

(19 MARKS )

Fill in the blanks the appropriate word required. If there were available spaces for more than one word you should put down the words in the right order.

1. Trilobites belong to the superphylum \_\_\_\_\_.
2. The \_\_\_\_\_ is the serrated part of the Graptolite.
3. The \_\_\_\_\_ is the central area of the Echinoid shell in the adoral surface.
4. The two calcite plates called \_\_\_\_\_ serve as a protective operculum to the shell aperture of the Cephalopods.
5. The first acme of the Gastropods is in the \_\_\_\_\_ but the real acme is in the \_\_\_\_\_.
6. The Bivalves that anchor their shells in the sea bottom sediments are the \_\_\_\_\_.
7. The \_\_\_\_\_, the \_\_\_\_\_ and the \_\_\_\_\_ types of sutures distinguish the Ammonoids of the Upper Paleozoic, Triassic and Jur. Cretaceous.
8. The \_\_\_\_\_ is the unsegmented posterior part of the Trilobite which may have one spine called \_\_\_\_\_.
9. Graptolites can be used in subdivision and correlation of the \_\_\_\_\_ and the \_\_\_\_\_ systems.
10. The apical disc includes the \_\_\_\_\_ and the \_\_\_\_\_ rings of plates in addition to the central part and the anus.
11. The \_\_\_\_\_ of the Belemnites is bullet-shaped and interiorly ends by a conical cavity which is the \_\_\_\_\_.
12. The shell types of the Ammonites if were flattened, compressed, inflated or globular would be respectively called \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ or \_\_\_\_\_.
13. The Tribolites head like area at the anterior side is called \_\_\_\_\_.

14. The regular Echinoids' shell usually shows only 20 columns of plates except in the \_\_\_\_\_ Echinoids which show either more or less than 20 columns.
15. The inflections of sutures in the direction of the Ammonite aperture are the \_\_\_\_\_ whilst the opposite ones are the \_\_\_\_\_.
16. By orienting the lunule of the Bivalve shell towards you the valve on your right is the \_\_\_\_\_ valve and the other is the \_\_\_\_\_ valve.
17. The major disadvantage of Tribolites is that they are not \_\_\_\_\_.
18. The \_\_\_\_\_ is the larger plate in its ring and used in the orientation of Echinods.
19. The strength index  $h/r$  of the Cephalopods is taking into account the wall thickness (h) and the radius (r) of the \_\_\_\_\_.

**PART III**  
**MATCHING PAIRS**  
**(13 MARKS)**

Match the words in the right column with those in the left column. Use each Number on the left and each Letter on the right only once.

- |                         |                              |
|-------------------------|------------------------------|
| 1. Byssal notch         | a. Commissure                |
| 2. Patellate            | b. Uncoiled gastropoda shell |
| 3. Columella            | c. Anterior of a Bivalve     |
| 4. Cephalon             | d. Corona                    |
| 5. Protoconch           | e. Irregular Echinoid        |
| 6. Heteromorphs         | f. Tight coiling             |
| 7. Pachydon't teeth     | g. Rudist                    |
| 8. Monomyarian          | h. Trilobite anterior        |
| 9. Exocyclic            | i. Initial chamber           |
| 10. Adambulacral plates | j. Bivalve feature           |
| 11. Ambs and interambs  | k. One muscle scar           |
| 12. Smaller auricle     | l. Star fish                 |
| 13. Crenulations        | m. Retrogressive Coiling     |

**PART IV**  
**SUBJECTIVE QUESTIONS**  
**(20 MARKS)**

Answer **FOUR** questions **ONLY**

1. Explain how can you orient a regular Echinoid. Illustrate by a sketch.
2. Discuss the evolution of heteromorphs and give reasons for not considering them as overspecialized Cephalopoda forms.
3. Draw the dentition of the two valves of a Bivalve using the following formula.

$$\begin{array}{cccccccccccc} \text{IIIA} & \_ & \text{IA} & & \text{5a} & \_ & \text{3a} & \_ & \text{3b} & \_ & \text{5b} & & \text{IP} & \_ & \text{IIP} \\ \_ & \text{IIA} & \_ & & \_ & \text{4a} & \_ & \text{2} & \_ & \text{4b} & \_ & & \_ & \text{IIP} & \_ \end{array}$$

4. Write a brief account on the geological history of Trilobites.
5. Explain the Bivalves functional morphology in general and in specific considering the byssally attached groups.

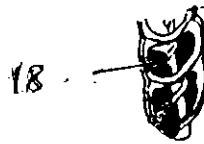
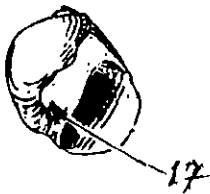
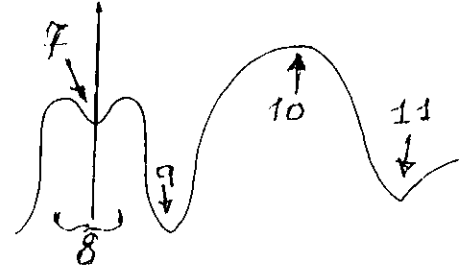
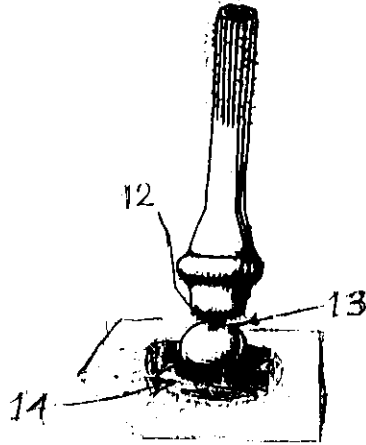
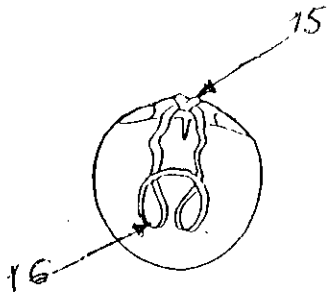
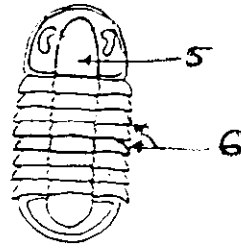
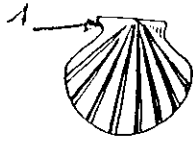
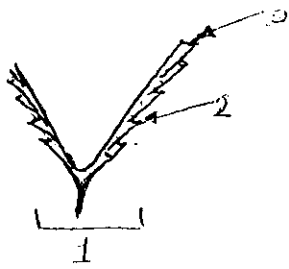
**PART V.**  
**(9 MARKS)**

Label the morphological features which are displayed in the sketches.

**PART VI.**  
**Practical work**  
**(25 MARKS)**

Identify 25 genera of the different groups. More than two wrong letters will result in cancelling half of the mark (if the letters are 3) or the whole mark (if the letters are > 3).

**GOOD LUCK**



PART V

- 1.
- 2.
- 3.
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- 9.

- 10.
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- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

